# THE IMPACTS OF EARLY COLLEGE CREDIT ON POSTSECONDARY ACADEMIC PERFORMANCE

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## Dedication

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**Abstract**

An increasing number of students have earned college credit while still in high school through dual enrollment courses, Advanced Placement exams, International Baccalaureate coursework, and other credit-earning opportunities, referred to as early college credit, or ECC, for this study (Austin-King et al., 2012; Karp et al., 2007; Koelling, 2008; Murphy & Dodd, 2009; Sadler & Tai, 2007; Swanson, 2008). The purpose of this study was to examine the relationship between ECC and academic performance for students at a rural, public liberal arts college in the Midwest, specifically seeking to determine if ECC students earn a higher grade point average (GPA) after one or two semesters of college, if ECC and non-ECC students bare similar credit loads or persist to a second year and on to degree completion at different rates, and finally, if ECC students complete their degrees quicker than non-ECC students. Utilizing a non-experimental, descriptive design to examine the relationship between ECC and these academic performance indicators, the researcher considered first year students at Midwestern College who enrolled each year from fall 2004 through fall 2007, totaling 1448 students in all. Chi-square, ANOVA, and MANOVA analyses led to results indicating a positive relationship between ECC and college academic performance. Generally, ECC students earn higher first, second and third term GPAs, complete more credits, graduate with a higher GPA, and graduate earlier than non-ECC students. Researchers concluded that ECC experience does predicts a higher potential for success at Midwestern College, but further study should examine causation versus correlation.

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# Chapter 1

## Introduction

An increasing number of students have earned college credit while still in high school through dual enrollment courses, Advanced Placement exams, International Baccalaureate coursework, and other credit-earning opportunities (Austin-King et al., 2012; Karp et al., 2007; Koelling, 2008; Murphy & Dodd, 2009; Sadler & Tai, 2007; Swanson, 2008). In some states, instances of early college credit have increased even while the high school population declined: Minnesota, for example, saw a 62% increase in AP participation, 20% in dual enrollment classes offered in the high school, and a 4% increase in the number of high school students taking college courses on a college campus between 2005-2006 and 2010-2011, while the number of high school students decreased by 5% (Austin-King et al., 2012, p. 1). Nationwide, Advanced Placement "grew dramatically over the last 20 years, with a sustained increase in the number of exams including all subject areas of 9.3% annually", a rate five times that of growth in number of US high school students (Sadler, 2007, p. 5). While "data on student participation in dual enrollment are only beginning to be collected" (Karp et al., 2007, p. 12), existing program-level data revealed growth by the thousands in several programs. New York City's College Now program saw a 70% increase in participation between 2001 and 2004. In the state of Texas, the percentage of students participating in dual enrollment grew from 4.8 percent in 1990-91 to 15.6% in 2001-02; Florida reported that the number of students participating expanded from 27,689 in 1988-89 to

34, 273 in 2002-03 (Karp et al., 2007, p.12), and "this growth is likely to continue" (p. 13).

Despite this rapid expansion, few empirical studies exist analyzing the actual impact of early college credit (Karp et al., 2007; Klopfenstein & Thomas, 2005; Sadler 2007; Swanson, 2008). This lack of research inspired questions regarding the effectiveness of early college credit and its potential impact at secondary and postsecondary levels, especially regarding the possible connection between these academic experiences and success at a four-year postsecondary institution.

**Purpose of the Study**

The purpose of this study was to examine the relationship between early college credit (ECC) and academic performance for students at a rural, public liberal arts college in the Midwest. Some previous correlation studies have highlighted institution-specific information while others have examined the effects of ECC in general. This study followed an institution-specific model as policies regarding the acceptance of ECC vary greatly from college to college (Swanson, 2008).

The postsecondary institution in question, herein referred to as Midwestern College, had not previously investigated the link between ECC and academic performance of incoming students. As the college saw a marked increase in the number of students enrolling with ECC in recent years, especially through dual enrollment and Advanced Placement programs, as well as a higher average of credits per student, the need to understand the implications of early college credit experiences was significant.

**Significance of the Study**

Early college credit courses provide high school students with the opportunities to earn college credits prior to high school graduation, with the possibility of transferring those credits to a postsecondary institution. More high school students have completed courses for credit each year (Austin-King et al., 2012) primarily through dual enrollment (DE) and Advanced Placement (AP) opportunities (Austin-King et al., 2012; Klopfenstein & Thomas 2007). Dual enrollment students earned college credit through course completion, and courses may have been completed at a high school or college campus (Swanson, 2008). Advanced Placement credit is earned by passing an end-of-course exam administered by the College Board via Educational Testing Service (Klopfenstein & Thomas, 2005). However early college credit is earned, the postsecondary institution at which the student enrolls determines if and how early college credits transfer.

Both dual enrollment and Advanced Placement opportunities emerged in the mid-20$^{th}$ century (Klopfenstein & Thomas, 2009; Koelling, 2008). Dual enrollment was offered to prepare high school students for college through a more challenging academic curriculum, allowing them to acclimate to a college environment prior to postsecondary enrollment (Hughes et al., 2012). Advanced Placement courses were started with a similar purpose: to earn credit for, or at least higher placement into, college coursework (Klopfenstein & Thomas, 2009). Since their implementation, both programs have grown exponentially, but there is a lack of empirical studies verifying

the effectiveness of the impact of these courses on postsecondary achievement (Bailey & Karp, 2003; Karp et al., 2007; Klopfenstein & Thomas, 2009; Koelling, 2008).

Karp, Calcagno, Hughes, Jeong, and Bailey (2007) provided one of the first rigorous analyses of two established dual enrollment programs. Using data from the state of Florida and New York City's College Now program, the researchers verified a positive relationship between dual enrollment experience and grade point averages, persistence, and progress toward a degree (Karp et al., 2007). Karp (2007) conducted a study independently the same year, looking to the sociological benefits of "trying on the role of a college student" in New York City's College Now program (p. 5). She concluded that the authenticity of a course in this particular dual enrollment program led to a better understanding of the role of a college student, supporting such experiences as a contributor to postsecondary success (Karp, 2007). Zunkel et al. (2012) studied the impact of ECC on students at Iowa State University and found that students with ECC have slightly higher grade point averages throughout their first year and benefit from a slightly shorter time to graduation: 4.1 years at opposed to 4.5 years for those entering in Fall 2005 with 19+ college credits.

Klopfenstein & Thomas (2009) studied the proposed link between Advanced Placement and early college success and specifically sought to distinguish AP as an indicator of academically motivated students (and hence more likely to succeed in college) or an experience that produced positive outcomes in college. They "found no evidence that AP course-taking increases the likelihood of early college success beyond that predicted by the non-AP curriculum for the average student, regardless of race or

family income" casting "serious doubt on the causal effect of AP experience and college success" (p. 874). In an earlier work with the same dataset, Klopfenstein & Thomas suggested that "AP experience may serve as a signal of high ability and motivation," just not the sole indicator of academic readiness (2005, p. 14). Sadler and Tai (2007) investigated the claim of course equivalency between AP and college coursework by College Board. Though a positive association was found between AP exam scores and grades for the equivalent course, the exam scores did not match to the corresponding letter grade they were meant to represent.

Studies regarding the connection between dual enrollment or Advanced Placement and college academic achievement presented findings that suggest some sort of relationship. Without controlling for preexisting characteristics, students with these ECC experiences seemed to fare better than non-ECC peers in college. After accounting for other academic influencers, though, the difference between the two groups either diminished or was reduced significantly. These analyses indicate what could be the predictive, not *causal*, nature of ECC experiences on postsecondary success. The majority of research in this area called for more empirical studies examining the impact of ECC coursework on broad and narrow levels.

Very few studies have focused on the relationship of dual enrollment or advanced placement and academic performance at a small, liberal arts college. This study sought to provide Midwestern College information regarding ECC participation of enrolled students and what such secondary experiences may indicate about a

student's academic future at the institution. Specific research questions were as follows:

1. Do students with these early college credit experiences earn a higher grade point average after one or two semesters of college?
2. Are credit loads similar between ECC and non-ECC students?
3. Do ECC students persist to a second year and on to degree completion at a higher rate than students without ECC?
4. Do ECC students earn their baccalaureate degrees sooner than students with no ECC?

The results of this study could aid in placing students into the appropriate college level course and impact the holistic admission review practice. Faculty and administrators at Midwestern College have expressed concern over the legitimacy of early college credit experiences, and the results of this study could alleviate or reaffirm their concerns. Future implications could go as far as a change in transfer credit policy, advising practices, and admissions review processes.

**Setting**

Midwestern College, a small, public, liberal arts college was the setting for this study. Students considered were from all over the United States and the majority graduated from Minnesota high schools. They were typically Caucasian, though there were a significant number of students of color, and many of the students are the first in their family to enroll in college.

Midwestern College has experienced an increase in the number of students since 2008. First year students who enrolled during the fall semesters of 2004-2007 were considered because of the consistent number of enrollees during this time, and due to the fact that enough time has lapsed since 2007 to allow for more accurate graduation statistics. Finally, given the timing of this study, students who started at Midwestern College in 2007 could be considered in the school's 4- and 6-year graduation rates. In all, the group totaled 1448 students.

**Assumptions**

The researcher has worked in admissions for seven years, and during that time, has reviewed many applications with transcripts including a variety of courses. The training opportunities, literature, and conferences associated with the position have provided various perspectives regarding the usefulness and role of early college credit in admissions decisions at a selective college. The overwhelming assumption regarding ECC experience is that success in AP and DE courses indicates a higher likelihood of success in a classroom at Midwestern College. Through the years, the researcher has seen more instances of ECC: more students seem to be taking the classes, more high schools seem to be offering ECC opportunities, and individual students seem to be taking more ECC classes. As these experiences have increased, the researcher has started to question the role of ECC in the admissions review process, especially since no one at the institution has actually examined the relationship between these classes and academic performance. This meant that, while the preference is to see challenging

coursework on a high school transcript, one could no longer assume that a student with AP or DE classes would necessarily experience more success than a non-ECC peer.

The researcher has also had the opportunity to serve as a mathematics teaching specialist at the same institution, instructing the lowest level of algebra-based math. Students who pursue a major with a calculus requirement are asked to take a math placement exam, often regardless of DE or AP math courses. Placed into the researcher's class were students with no ECC, ECC at the same level at the course taught, and even some who had credit that would put them ahead of the class content. In the researcher's experience with the class, all of the students were placed appropriately, including those who had a higher level math class in high school, ECC or otherwise. This had led the researcher to question the validity of these courses while at the same time wondering if this was unique to math or would include other subject areas as well.

Overall, there was a need to examine the role of early college credit coursework and information to glean from these classes. This need provided the motivation to complete this project, and the researcher's experiences have fueled some contradictory beliefs regarding the results, furthering the need to conduct an empirical study regarding ECC.

**Limitations**

In this study, only students attending Midwestern College were considered. As institutions of higher education create transfer credit policies specific to their school,

results may be different from university to university or college to college. The results may indicate a common relationship between ECC and academic performance, but should not be generalized to every institution.

The purpose of this research was not to determine the effectiveness of ECC as college preparatory experiences, but rather to investigate the effectiveness of ECC as a *predictor* of college academic performance at Midwestern College.

Other ECC opportunities exist (International Baccalaureate, TexPREP, etc) but were not investigated as thoroughly due to the small number of these credits transferred to Midwestern College. The researcher was not able to differentiate between DE credits earned on a high school campus from a secondary instructor versus those earned on a college campus from a professor.

Furthermore, time and available data did not provide the means necessary to examine or control for other indicators of academic success, such as ACT scores, socioeconomic status, college preparatory curriculum, and high school characteristics. Therefore, the results should be interpreted as a simple analysis of one possible factor that has influenced postsecondary academic performance.

**Definitions**

- Early College Credit (ECC) – programs and courses through which students earn both high school and college credit.

- Advanced Placement (AP) – courses offered at a high school, taught by high school teachers; credit may be earned by passing an end-of-course exam.

- Dual Enrollment (DE) – college credit is earned through course completion; courses may be offered on a high school or college campus and taught by high school or college instructors.

**Summary**

Early college credit opportunities have increased over the last few years, which has resulted in more college credits for incoming first year students at Midwestern College. The purpose of this study was to investigate whether these ECC experiences could be used as a predictor of success at Midwestern College by examining the relationship between ECC coursework and college success measures.

# Chapter 2

## Literature Review

To understand the impact of early college credit on college academic performance, a review of existing literature was required. This review addressed the history, purpose, and expansion of early college credit, with special attention paid to Advanced Placement and dual enrollment opportunities, as early college credits for Midwestern College students are primarily earned through these opportunities. The review also focused on the relationship between dual enrollment and postsecondary academic performance, and finally, summarized research regarding Advanced Placement coursework and academic achievement in college.

### The Purpose of and Push for Early College Credit

Early college credit programs have allowed high school students to earn high school and college credit prior to making the move to college (Zunkel et al., 2012). Dual enrollment and Advanced Placement courses have been two options from which most ECC is earned (Austin-King et al., 2012).

First offered in the 1950's, dual enrollment was created to allow high school students to earn both high school and college credit for the same course (Koelling, 2008). The idea behind this opportunity was to prepare high school students for postsecondary education through a more academically challenging course schedule (Hughes et al., 2012; Swanson, 2008) which allowed these students to become "familiar and comfortable with the college environment" (Hughes et al., 2012, p. 9). Through

dual enrollment, college credit has been awarded upon course completion and transferred to a prospective degree granting institution. Courses have been taught on a college campus by college faculty or at the high school, often by teacher who had a Masters or sometimes a doctorate in that course subject (McCauley, 2007, p 2).

Advanced Placement emerged in 1957 as an opportunity for students to earn credit, or at least advanced placement, for college-level coursework (Klopfenstein & Thomas, 2009). If a college has chosen to provide credit based on college credit, it has done so based on an end-of-course exam score provided by the student and based on institution-specific credit policies (Klopfenstein, 2003). The Advanced Placement trademark was started by College Board, and tests have been administered by Educational Testing Service, or ETS (Klopfenstein & Thomas, 2009).

Overall, ECC has received attention as the response to state and federal governments' acknowledgement of the gap between high school graduation and college admission requirements (McCauley, 2007, p. 1). Evidence of this gap included the rate at which students who enroll at four-year institutions obtain a degree, which, in 2007 was about half. McCauley (2007, p. 2) stated that this statistic "indicates many students are not successfully completing college coursework and graduating in six years or less." In the same work, McCauley (2007) also cited postsecondary initiatives to graduate as many students as possible in a timely manner (p. 2) and states' desires to add college graduates to their workforce (p. 3) as further incentive to expand DE and AP opportunities (see also Swanson, 2008).

And expand it did. In Minnesota alone, participation increased by more than 60% in Advanced Placement and International Baccalaureate programs between FY 2006 and FY 2011 and dual enrollment increased by 20% between FY 2008 and FY 2010 while overall public high school enrollment decreased (Austin-King et al., 2012, p. 38). Austin-King et al. (2012) also found that participation by students of color in ECC "increased more rapidly than participation by the overall high school population" and "participation by low-income students increase more rapidly than participation by the overall population in some, but not all" ECC opportunities (p. 1). Nationwide, Sadler and Tai (2007) revealed a "sustained increase in the number of exams of 9.3%" for Advanced Placement courses, which "is more than five times faster than the growth of the US high school population" (p. 5). While longitudinal data for dual enrollment did not exist, "program-level data indicate an increase in participation" and "the growth is likely to continue" (Karp et al., 2007, pp. 12-13; see also Swanson, 2008). The reauthorization of No Child Left Behind has been partially behind this trend, specifically in its charge that "all high school graduates emerge ready for college" (Swanson, 2008, p. 19). States have been instructed: "1) to increase student participation in rigorous college preparatory courses; 2) better align expectations between high school and postsecondary education; and, 3) hold these systems accountable and ensure students graduate from high school ready for college or the workplace," driving school districts increase partnerships with postsecondary institutions and offer more dual enrollment classes (Zuchelli, 2010, pp. 125-126), even without first studying the effectiveness of these experiences. Similarly, Advanced Placement has been implemented at higher rates under the same assumption of

increased rigor, and hence better preparedness for postsecondary opportunities (Klopfenstein & Thomas, 2009).

The rapid growth of ECC opportunities has not been met with the same level of empirical studies verifying the effectiveness of these courses on postsecondary academic records (Bailey & Karp, 2003; Karp et al., 2007; Klopfenstein & Thomas, 2009; Koelling, 2008). Data regarding dual enrollment participation has only begun to be collected (Bailey & Karp, 2003; Karp et al., 2007). In an extensive review of 45 articles regarding credit based transition, or early college credit, programs, Bailey and Karp (2003) found that "only 21 discussed program outcomes… [and of those], few attempted to take account of confounding factors such as student characteristics, prior student achievement, or student motivation" (p. *x*). The articles reviewed indicated promise and potential in ECC opportunities, but the authors encouraged further examination of these programs through better data and rigorous statistical analyses, with a focus on student outcomes with consideration for preexisting student characteristics.

On the other hand, studies showing the relationship between Advanced Placement exam scores and college success have been around for a long time. These studies were often conducted by parties invested in the success of the program and led the public to conclude that "AP courses cause college success; and subsequently infer that the expansion of the AP program will improve college outcomes for an expanded set of AP takers" (Klopfenstein & Thomas, 2009, p. 874). This "faulty reasoning" (p. 874) was not without its costs, leading to a charge to subject the effectiveness of AP experience to rigorous, unbiased testing (see also Sadler & Tai, 2007).

Some empirical & unbiased studies regarding dual enrollment, advanced placement, and other early college credit opportunities have emerged within the past few years. A brief review of those regarding dual enrollment and Advanced Placement, follow, and each was considered separately given the relatively small overlap between AP and DE participation of 12.7% (Swanson, 2008, p. 331).

**The Impact of Dual Enrollment**

In a first-of-its-kind study Karp, Calcagno, Hughes, Jeong, and Bailey (2007, p. 15), found evidence strongly suggesting a relationship between dual enrollment participation in career and technical education (CTE) courses and positive postsecondary outcomes. In response to an abundance of qualitative studies but lack of rigorous, quantitative work, the team "employed statistical methods to examine the outcomes of dual enrollment participation for students in two large, well-established dual enrollment programs" (p. 14): the state of Florida and New York City's College Now program.

The data available for the state of Florida allowed the authors to analyze dual enrollment participation for all students in the state as well as a sub-sample of CTE students. In the short-term, dual enrollment participation showed a statistically significant positive association with likelihood of the attainment of a high school diploma and postsecondary enrollment. Further investigation regarding students who did continue on to college revealed a statistically signification relationship between DE students and full time enrollment, first term grade point averages, and persistence to a second term. In the long term, a similar association existed between second year and

final grade point averages, persistence to a second year, and total postsecondary credits earned (Karp et al., 2007, p. 36). All of these findings also held true for the CTE sub-sample.

New York City's data were used only to review the impact of participation for CTE students but echoed the findings for the state of Florida in some areas. CTE students were more likely to pursue a bachelor's degree, had higher first term grade point averages, and earned more college credits after three-and-a-half years out of high school than non-CTE peers (Karp et al., 2007, p. 52).

Overall, the work presented "very encouraging, though not definitive, findings that dual enrollment participation is related to positive postsecondary outcomes" (Karp et al., 2007, p. 65), and a particularly strong association for groups of students who typically struggle in college, especially male and students with low socioeconomic status. As the argument to expand dual enrollment opportunities "often rests on an assumption that… low-income or low-achieving students… may benefit from early exposure to the demands of a college course" (p. 55), this particular conclusion was of special importance. Though the authors were able to implement controls accounting for some preexisting student characteristics, they could not account for all and cautioned readers to careful interpretation of the results, with a charge to conduct "future research [establishing] a causal relationship between dual enrollment participation and education outcomes" (p. 67). The authors concluded that the expansion of dual enrollment may be warranted and encouraged states to consider broadening dual enrollment opportunities as well as access to these coursework beyond just the academically advanced students.

Karp (2007) examined the benefits of NYC's College Now program beyond academic outcomes and conducted a case study following first semester DE students at a low income high school in New York City, looking for the social benefits tied to "trying on the role of a college student" (p. 5) through anticipatory socialization and role rehearsal. She found a positive relationship between course authenticity of CollegeNow courses and student understanding of the role of a college student, emphasizing the importance of mimicking a college environment in a dual enrollment course as well as the need for participation students to "incorporate their experiences into mental schemas of 'college student'" (p. 22-24). Her findings supported dual enrollment as a contributor to postsecondary achievement, and Karp (2007) encouraged implementation of quality control measures to lend as much authenticity to these courses as possible.

In summarizing research regarding dual enrollment for his colleagues, Dr. Robert Koelling (2008), a professor at Northwest College, reminded his peers that the push for more dual enrollment opportunities had continued "despite a lack of empirical evidence as to their education effectiveness" (p. 2). He stated that criticism of these programs comes primarily from college faculty, with "increasing concern at other levels about the quality of these programs and which students have access to them" (p. 2). In reviewing studies regarding the effectiveness of dual enrollment, Koelling (2008) found few studies statistically validating better postsecondary performance for DE students, and those few studies cannot distinguish between dual enrollment as causation versus correlation.

Joni Lynn Swanson (2008) took an interest in the anticipatory socialization opportunities presented by dual enrollment participation and the resulting influence upon degree persistence and attainment. She used inferential statistical methods in developing a causal model by which to analyze the relationship between dual enrollment and student achievement, and was able to control for several demographic and academic characteristics linked to postsecondary performance. Her findings indicated that dual enrollment participants are more likely to persist to a second year in college and to do so without taking more than a semester break, but, interestingly, were no more likely to have 50 or more credits than non-DE participants by the end of their second year. Further, Swanson (2008) discovered a clear connection between continuous enrollment through the second year of college and degree attainment, but no positive relationship between cumulative credits at the end of the second year and degree completion.

Counter to common perception and expectations for dual enrollment participation, Swanson's (2008) study determined that "dual enrollment participation alone failed to aid students' odds of earning a bachelor's degree in 4.56 years or less time from first entry into post-secondary education" (p. 325), and DE students were no more likely to complete a baccalaureate degree than non-participants. DE participants were, however, more likely to earn an AA or technical certification.

A closer look at her control variables led Swanson (2008) to interesting conclusions. Specifically, demographic control analyses "indicated that male and Hispanic students were less likely to achieve a BA in 4.56 years or less than were

female or White students" and "dual enrollment students who were economically disadvantaged were up to 26% more likely to earn an AA or a certificate than students" from a mid-level SES (p. 330). High school control variables included AP participation (students who took both DE and AP courses or exams) and a variable that controlled for students' "attitudinal changes and anticipations toward a bachelor's degree" (p. 332). While AP participation did not make earning a bachelor's degree any more likely, Swanson (2008) did suggest that "dual enrollment participation may act as a means to anticipate the attitudes and behaviors necessary for college success" (p. 356).

In their evaluation of the Concurrent Courses initiative to make dual enrollment programs available to low-income youth, Hughes et al. (2012) found that dual enrollment students earned grade point averages comparable to other non-DE first year students. DE students, however, were less likely to take remedial courses during their first year, were more likely to graduate from high school, more likely transition to a four year college rather than a two year college, and were more likely to complete their college degree, all while accumulating more credits than comparison students . Hughes et al. (2012) used their findings to conclude that participating students had better high school and college outcomes than comparison students.

Most of the recent studies have looked only at academic impacts and implications pertaining to students. Katherine Kinnick (2012), director of Kennesaw State University's Dual Enrollment Honors Program (DEHP), presented her research on the impact of dual enrollment on colleges and universities in a 2012 publication. KSU enrolled 23,000 students and 200 dual enrollment students for 2011-12. While dual

enrollment has been available since the 1970s, KSU adopted an honors model for its program in 1994. Admitted DEHP students met higher admissions standards, took courses on the KSU campus, and were integrated into the general student population. In evaluating the impact of DEHP on her institution, Kinnick first noted that "like many states, Georgia has no systematic data collection program to gather information on dual enrollment… [so] KSU's efforts to measure program impact have been initiated internally and findings are generally disseminated only at the campus level" (p. 42). Through these initiatives, Kinnick (2012) found "evidence of positive impact was strong in the areas of student recruitment, retention, progression, and graduation", which was not surprising given the honors model employed for dual enrollment at KSU (p. 42). Kinnick (2012) shared positive impact regarding the quality of the institution through the recruitment of high-achieving students, enhancement of the classroom environment, and "positive impact on the image of the university as a school of choice" (p. 42), but she expressed concerns regarding the viability of the program due to enrollment growth and resource scarcity. She echoed other research in her conclusion, calling for all states to collect more comprehensive data and for more empirical studies regarding the impact of dual enrollment opportunities.

An Early Credit Task Force at Iowa State University researched "student and institutional impacts associated with an increasing number of 'direct from high school students' entering Iowa State University with an increasing number of college credits earned while in high school" (Zunkel et al., 2011, p. 1), and was one of the few studies reviewed that looked at the overall impact of ECC rather than focusing on one singular ECC opportunity. Through extensive data analyses, student surveys, meetings with

various campus committees and units, and the review of university materials, they provided a final report with key findings as well as prioritized recommendations to ISU's Undergraduate Programs Council. Zunkel et al. (2011) determined that at least half of students in each undergraduate college entered with ECC in fall of 2010, ECC credits were primarily earned through dual enrollment coursework, and the most significant growth associated with Iowa residents bringing in transfer credits typically earned through community colleges. After controlling for incoming characteristics, the Task Force concluded: students with any amount of ECC have slightly higher GPA in their first semester and first year, somewhat shorter time to graduation are more likely to earn a minor (with 1-10 early credits), less likely to change majors, and, if they had earned more than 19 credits, were more likely to graduate with a second major than non-ECC students. The authors note that "increasing the amount of early credit does not have a significant impact on academic success outcomes (increase first term GPA, first year GPA, first year retention, second year retention). The only impact of increased credit was a greater chance of graduating within four years" (p. 1).

The Task Force took a closer look at key sequenced courses in math, chemistry, biology, physics, accounting, and English, and found the "most robust results due to the large number of students required to take both courses" (Zunkel et al., 2011, p. 17) between Calculus I and II (MATH 165 & 166), Calculus II and Calculus III (MATH 165 and 266), as well as Critical Thinking & Communication and Written, Oral, Visual, and Electronic Composition (ENGL 150 and 250). Data analyses revealed that students awarded credit for Calculus I through a community college tended to earn about one grade level lower in the subsequent course at Iowa State compared to students who

started the sequence at ISU, and a similar result for MATH 166 & 266. On the other hand, the school awarding credits for ENGL 150 had little effect on student grades for ENGL 250 after controlling for pre-existing characteristics. It should be noted that this particular analysis of sequenced courses compared only dual enrollment courses, not AP or other ECC opportunities.

While Zunkel et al. (2011) did include Advanced Placement credit in their consideration of early college credit, most of the studies considered to this point focused on dual enrollment experiences. Similarly, studies have been conducted with the intention of investigating AP coursework and postsecondary achievement.

**The Impact of Advanced Placement**

Klopfenstein and Thomas (2005) investigated the impact of Advanced Placement courses on second year retention and first semester college grade point averages, using the Texas Schools Microdata Panel (TSMP) and implementing controls for student, family, and high school characteristics also likely to impact college performance. They were able to compare 28,000 Texas high school graduates who attended 31 four-year public universities in Texas in 1999. Categorizing AP courses into 7 categories (math, science, English, economics, government, history, and psychology), Klopfenstein and Thomas studied "AP course experience rather than passing AP exam scores because students need not have learned enough material to pass the AP exam in order to have their college preparation enhanced" (p. 8). They noted that, since AP opportunities are opening to populations typically underrepresented in higher education, some students "begin AP courses with large academic deficits [so] it

is unreasonable, and even undesirable, for teachers to cover the entire AP curriculum" (p. 8).

Their findings suggested high school students with strong preparation in math, science, and English earn higher grade point averages and persist at higher rates than peers without similar backgrounds, but, after controlling for this type of curriculum, "AP courses provide little or no additional postsecondary benefit" (Klopfenstein & Thomas, 2005, p. 12). Narrowing their investigation to each of the seven categories of AP courses, Klopfenstein and Thomas (2005) found only AP science and AP economics significantly increased second year retention, and AP science improved first semester grade point averages for Hispanic students only. In sharing these conclusions, the authors pointed out that "the three most popular categories of AP classes, math, English, and history, do not significantly improve college retention or GPA" (p. 12). In an effort to explain the lack of relationship between AP experience and postsecondary achievement, Klopfenstein and Thomas (2005) criticized the rapid expansion of the AP program, stating that the rapid growth has led to simply renaming courses as Advanced Placement, providing AP courses to students with academic deficits while still trying to cover the same amount of material, and the inability to assure the quality of all AP courses (see also Klopfenstein, 2003).

Klopfenstein and Thomas (2009) discussed further interpretations and implications of their findings in a later publication. While emphasizing that the relationship between AP experience and postsecondary performance was not causal, they acknowledged that Advanced Placement coursework can be used as a predictor of

college success. They attributed the "predictive power of AP-taking" to the high ability, motivated students typically taking the courses and addressed the "relatively recent… and, we believe, unanticipated" role that this power has come to play in college admissions (p. 887). The authors used their earlier findings to encourage colleges to focus on high school math and science courses, with or without the AP designation. Klopfenstein and Thomas (2009) hoped such a move would shift the focus of parents and state policy makers on to academic experiences that do have a causal relationship with postsecondary success.

Salder and Tai (2007) also conducted an investigation into Advanced Placement as a predictor of success, but, instead of looking to indirect measures of the equivalent credit granting purpose of AP, directly examined the "College Board's claim of the equivalence of Advanced Placement courses as measured by AP exam scores with the comparable college course in three science disciplines: biology, chemistry, and physics" (p. 1). The authors also considered College Board's assertion that scores on the AP exams could be thought of as equivalent to letter grades for the college course the AP class represents, i.e., a score of 3 on the physics exam indicates a student would have earned a C in a college physics courses, a 4 corresponds to B, and 5 an A.

Using surveys collected by a large-scale national study of introductory college students and their high school experiences (*Factors Influencing College Science Success*, or Project FICSS), Sadler and Tai (2007) established a subsample representative of a national sample of students who participated in AP coursework but also took the equivalent introductory level college science course. In all, students in

124 different first semester, introductory level biology, chemistry, and physics courses in 55 colleges and universities provided the data, which resulted in 9,354 surveys. Of those, 1,029 students participated in the AP course equivalent to their current science class, and 316 of those students earned a 3, a passing score, on the end of course exam.

After running rigorous analyses of the data, with and without controls for demographics and academic preparation, Sadler and Tai (2007) offered their conclusions for their readers as well as suggestions for College Board's future research. Without accounting for preexisting characteristics, Sadler and Tai (2007) found students with any AP experience out perform their non-AP peers with grades about 4 points higher than the class average. Upon implementing controls, "the apparent advantage held by students with AP experiences in high schools were roughly cut in half" (p. 12). The authors also disclosed that AP students who earned a 1 on the exam did no better than non-AP students, and those who had scored a 2 fared the same as students who took an honors course in high school. These results led the authors to surmise that "students reporting low AP exam scores may have gained no benefit from their AP course" (p. 13). As for students passing the exam, students with a score of 3 (AP3) did as well as AP participants who did not take the exam (1.5 points above the class average), AP4 science grades were 3.4 points above average, and AP 5 students earned 4.6 points higher than average in their science course. Sadler and Tai (2007) acknowledged the promise in these results, but quickly added further context to their findings by revealing the class average for the science courses: just above 80. As this corresponded to a letter grade of B-, easy arithmetic revealed that even AP5 students earned no better than a B on average, counter to the College Board's claim that a 5

indicates understanding at the A level for the course, and this with a previous year's experience covering the same material.

College Board has had several research reports to support their claims regarding the Advanced Placement program. One such report by Murphy and Dodd (2009) compared postsecondary records of AP and non-AP students from public high schools in Texas that enrolled in public Texas higher education. AP students were those who took the course only, exam only, or both the course and exam, while non-AP students were considered in two groups: those with dual enrollment only and other classes only. Within each cohort, students were matched by academic ability as determined by SAT score category and participation in the Free or Reduced Lunch Program, and compared on several levels: first and fourth year GPAs, first and fourth year cumulative credits, and four year graduation rate. Using multivariate and univariate analyses for each AP subject as well as aggregate AP experiences, the researchers concluded AP course and exam students performed better than dual enrollment students in each area except AP Biology, and over the other course only group in every area. Within the AP group itself, the course and exam cohort also outperformed course only and exam only students in generally every area. Furthermore, evidence suggested that students with higher exam scores earned higher college GPAs than those with lower scores. It should be noted that much of the supporting literature cited in this publication were also Research Reports or other works with College Board connections, and controls were not implemented to differentiate between causation and correlation of the different AP or non-AP experiences and postsecondary performance.

## Summary

The demand for rigorous coursework at the secondary level has been on the rise, which has resulted in more ECC opportunities. Prior research indicated a relationship between ECC credits and college GPA, persistence, and degree attainment, but the extent to which academic parameters were affected may vary by institution and by ECC opportunity. The purpose for conducting investigations involving ECC also differed. Whatever the institution or purpose, the distinction between early college credits as indicators of postsecondary success as opposed to a reason for academic achievement in college needed to be front of mind.

# Chapter 3

## Methodology

This study used a non-experimental, descriptive design to examine the relationship between dual enrollment, International Baccalaureate or Advanced Placement coursework and postsecondary academic achievement at Midwestern College. The research questions were: Do students with these early college credit experiences earn a higher grade point average after one or two semesters of college? Are credit loads similar between ECC and non-ECC students? Do they persist to a second year and on to degree completion at a higher rate than students without ECC? Do they earn their baccalaureate degrees sooner than students with no ECC? The following paragraphs describe the methods used to answer these questions at Midwestern College, after first introducing the students considered for this study. A section regarding data collection and analyses closes the chapter.

### Setting and Participants

Students who enrolled as first year (non-transfers) students at Midwestern College between 2004 and 2007 were considered for this study. Midwestern College is a small, public, liberal arts, baccalaureate institution. Of the about 1,148 degree seeking students considered for this study, 596 were male and 852 were female, and 1146 identified as white and 302 were students of color.

All students fit in to one of two groups: ECC or non-ECC. For the purpose of this study, ECC students had earned any amount of college credit through any of

Advanced Placement, International Baccalaureate, and dual enrollment opportunities prior to beginning their first semester out of high school at Midwestern College. Midwestern College awards AP credit for scores of a 3 or higher, IB credit based on scores of 5-7, and dual enrollment credit for any courses taken through a regionally accredited postsecondary institution.

Table 1 in chapter 4 provides the detailed demographic information and analysis of the students considered in this study.

**Research Procedures**

Upon approval by the Institutional Review Board, pre-existing data were provided by the university's office of institutional research and office of admissions. The data were used to establish average grade point averages (GPAs), credits per term, cumulative credits, and cumulative GPAs for students' first, second and third terms; retention rates, graduation rate; cumulative GPA and credits at graduation; and time to degree completion for each cohort for all students, including ECC students and non-ECC students.

**Data Gathering and Analysis**

Data necessary to conduct this research, as provided by the Office of Institutional Research as well as the Office of Admissions, was gleaned from four databases. One database provided the students enrolled for each term as well as term statistics. Advanced Placement & International Baccalaureate credits as well as degree information (date degree conferred, GPA, cumulative credits) were downloaded from a

second database, while a third database provided the number of dual enrollment credits earned outside of Midwestern College. To determine which students received early college credit from Midwestern College while still in high school, a fourth database was utilized. All information was merged into a separate spreadsheet for each year, and finally combined into one document for all students considered. Once combined, identifiable data, such as student names and IDs were removed before data analysis.

The raw data were used to determine ECC profiles for each cohort and the overall group. Specifically, the researcher recorded the number of ECC and non-ECC students, average ECC earned when dispersed amongst the entire cohort as well as just ECC students, and the distribution of the types of ECC considered: DE, AP, and IB. The researcher also calculated academic descriptive statistics for the groups, including the average GPAs and credits, both per term and cumulative, for the first three semesters of a student's career at Midwestern College. Grade point averages indicated a student's academic performance and credits revealed the students progress to degree completion, as 120 cumulative credits are required to graduate from Midwestern College.

The semesters were considered in sequence of consistent enrollment, i.e., if a student did not enroll for the spring after their first term but chose to re-enroll for the upcoming fall, their statistics counted against the second semester marks, but their fall statistics, which would be the second term of enrollment out of the third possible term of enrollment, were considered for the overall third semester numbers.

The number of enrollees from the first to second and the first to third semesters was used to determine each retention rate. The total graduates for each cohort were compared to first semester enrollment and this provided the graduation rates. Time to degree required manual data entry first, as only the degree conferral date was available through the database. Any student with a degree cleared within one month of the end of the spring term was assigned a whole number, while students whose degree dates extended into the winter term were assigned a half year value. These numbers were then used to establish the average time to degree in years. Though Midwestern College primarily recorded four- and six-year graduation rates, any students who had completed their degree were included in the graduation statistics, even if one took more than six years to complete the degree.

All data, including participant demographic data, ECC profile, and major dependent variables, were analyzed to compare ECC and Non-ECC groups. The chi-square analyses were employed to compare the proportion of demographic information, such as Gender and Ethnicity, of two groups. Because the retention data at $2^{nd}$ and $3^{rd}$ semesters and graduation were category or nominal scale with Yes or No response, they were also analyzed as a proportion using chi-square.

For major dependent variables, such as GPAs and Credit Loads, the multivariate analyses of variance (MANOVAs) were used because each category of variable had multiple inter-correlated measures; for example, GPAs consisted of six measures: (1) the first semester GPA, (2) the second semester GPA, (3) the second semester cumulative GPA, (4) the third semester GPA, (5) the third semester cumulative GPA

and (6) cumulative GPA at graduation. Since these six measures were likely to be highly correlated each other and type I error would be large if analyzed individually, MANOVAs were used and then univariate ANOVAs were followed for each of six measures. One exception was Year to Graduate; this was single measure on a continuous variable so that independent t-test was used to compare ECC and Non-ECC groups.

**Summary**

A set of four cohorts of first year students at Midwestern College provided the data necessary for this research. For this data set, chi-square analyses, ANOVAs, and MANOVAs were utilized to determine the differences, if any between ECC and non-ECC students and academic performance at Midwestern College. The academic measures included first, second and third semester term and cumulative GPAs; retention and graduation rates; graduation GPA; time to degree; and term and cumulative credit loads for first, second, and third semesters as well as at the time of graduation.

# Chapter 4

## Results and Discussion

The search for differences between students with early college credit experience and those without on college academic performance led to interesting conclusions and possible implications for ECC as predictors of success at Midwestern College. The results are disclosed in the paragraphs to follow and the chapter concludes with a discussion regarding the researcher's findings.

### Results

The findings that follow start by describing the characteristics of students in the sample, then follow with a subsection in response to each of the research questions posed for this study.

**Participant characteristics.** Table 1 presents participants demographic information by ECC and Non-ECC groups for each year and four-year total. In the combined four-year data, the ECC group included significantly more male students (63.1%) than Non-ECC group (52.4%) (chi-square = 16.4, $p$ <.01), and significantly more White students (82.5%) than in the Non-ECC group (74.0%) (chi-square = 28.7, $p$ <.01).

**Comparison of ECC and non-ECC: grade point average (GPA).** Table 2 displays the results of means (M), standard deviations (SD) and statistical analyses for differences in GPAs between ECC and Non-ECC groups for 2004 – 2007 data, and the

Table 1

*Paricipants Demographic Information and Characteristics*

| | 2004 | | 2005 | | 2006 | | 2007 | | 4 Year Total | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable | ECC | Non-ECC | ECC | Non-ECC | ECC | Non-ECC | ECC | Non-ECC | ECC | | Non-ECC | | Chi-square |
| *Gender* | number (n) | | | | | | | | n | (%) | n | (%) | |
| Male | 149 | 80 | 123 | 84 | 140 | 74 | 137 | 65 | 549 | (63.1) | 303 | (52.4) | 16.4** |
| Female | 76 | 70 | 80 | 63 | 77 | 86 | 88 | 56 | 321 | (36.9) | 275 | (47.6) | |
| Total | 225 | 150 | 203 | 147 | 217 | 160 | 225 | 121 | 870 | | 578 | | |
| *Ethnicity* | | | | | | | | | | | | | |
| AmIndian | 17 | 17 | 20 | 22 | 19 | 25 | 15 | 15 | 71 | (8.2) | 79 | (13.7) | 28.7** |
| Asian | 9 | 8 | 6 | 8 | 13 | 8 | 10 | 5 | 38 | (4.4) | 29 | (5.0) | |
| Black | 2 | 5 | 4 | 3 | 6 | 9 | 3 | 3 | 15 | (1.7) | 20 | (3.5) | |
| Hawaiian | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | (0.0) | 1 | (0.2) | |
| Hispanic | 4 | 2 | 4 | 2 | 6 | 0 | 6 | 2 | 20 | (2.3) | 6 | (1.0) | |
| NS | 1 | 2 | 3 | 3 | 3 | 4 | 1 | 6 | 8 | (0.9) | 15 | (2.6) | |
| White | 192 | 116 | 166 | 109 | 170 | 114 | 190 | 89 | 718 | (82.5) | 428 | (74.0) | |
| | Mean (M) | | | | | | | | M | (SD) | M | (SD) | |
| *ECC* | 13.2 | 0 | 14.2 | 0 | 16.1 | 0 | 17.9 | 0 | 15.3 | (12.8) | 0 | n/a | |
| *AP Credits* | 4.0 | 0 | 4.9 | 0 | 4.5 | 0 | 5.4 | 0 | 4.7 | (8.6) | 0 | n/a | |
| *IB Credits* | 0.6 | 0 | 0.3 | 0 | 0.5 | 0 | 0.2 | 0 | 0.4 | (2.8) | 0 | n/a | |
| *Total DE* | 8.6 | 0 | 9.0 | 0 | 11.1 | 0 | 12.3 | 0 | 10.3 | (12.9) | 0 | n/a | |
| *UofM DE* | 3.0 | 0 | 4.8 | 0 | 6.6 | 0 | 8.1 | 0 | 5.7 | (11.0) | 0 | n/a | |
| *Non-UofM DE Credits* | 5.6 | 0 | 4.2 | 0 | 4.5 | 0 | 4.2 | 0 | 4.6 | (9.2) | 0 | n/a | |

*Note.* ** $p$ <.01

Table 2

*Comparison of GPAs between ECC and Non-ECC Groups*

| | 2004 | | | 2005 | | | 2006 | | |
|---|---|---|---|---|---|---|---|---|---|
| Varaible: GPA | ECC | Non-ECC | | ECC | Non-ECC | | ECC | Non-ECC | |
| *Multivariate F* | 4.46** | | | 1.96 | | | 1.42 | | |
| | M | M | F(6, 242) | M | M | F(6, 209) | M | M | F(6, 219) |
| *1st semester* | | | | | | | | | |
| Semester | 3.39 | 3.09 | 12.3* | 3.35 | 3.08 | 7.3** | 3.28 | 3.11 | 2.9 |
| *2nd semester* | | | | | | | | | |
| Semester | 3.31 | 3.01 | 8.9** | 3.29 | 3.06 | 5.9* | 3.22 | 3.00 | 5.5* |
| Cumulative | 3.40 | 3.02 | 23.4* | 3.32 | 3.06 | 8.0** | 3.27 | 3.09 | 5.0* |
| *3rd semester* | | | | | | | | | |
| Semester | 3.40 | 3.02 | 10.7* | 3.25 | 3.14 | 1.1 | 3.23 | 3.19 | 0.2 |
| Cumulative | 3.37 | 3.05 | 15.6* | 3.31 | 3.08 | 7.0** | 3.28 | 3.09 | 5.4* |
| *Graduation* | | | | | | | | | |
| Cumulative | 3.41 | 3.20 | 8.8** | 3.34 | 3.11 | 9.1** | 3.34 | 3.22 | 2.2 |

| | 2007 | | | 4-Year Combined | | | | |
|---|---|---|---|---|---|---|---|---|
| | ECC | Non-ECC | | ECC | | Non-ECC | | |
| *Multivariate F* | 4.46** | | | 8.69** | | | | |
| | M | M | F(6, 211) | M | (SD) | M | (SD) | F(6,902) |
| *1st semester* | | | | | | | | |
| Semester | 3.27 | 2.86 | 17.8** | 3.32 | (0.66) | 3.05 | (0.67) | 33.8** |
| *2nd semester* | | | | | | | | |
| Semester | 3.19 | 2.83 | 14.1** | 3.25 | (0.67) | 2.98 | (0.70) | 31.4** |
| Cumulative | 3.25 | 2.85 | 20.1** | 3.31 | (0.60) | 3.01 | (0.61) | 48.9** |
| *3rd semester* | | | | | | | | |
| Semester | 3.15 | 2.93 | 4.3* | 3.24 | (0.70) | 3.09 | (0.68) | 9.9** |
| Cumulative | 3.22 | 2.85 | 21.2** | 3.29 | (0.58) | 3.03 | (0.59) | 42.1** |
| *Graduation* | | | | | | | | |
| Cumulative | 3.31 | 3.12 | 6.7** | 3.35 | (0.53) | 3.17 | (0.54) | 23.9** |

*Note.* $^{**}p < .01$, $^{*}p < .05$

four-year total. The work was in response to Research Question 1: Do students with ECC experiences earn higher GPAs after one, two, or three semesters and at graduation in college? Results of the multivariate analyses of variance (MANOVAs) revealed that there were statistically significant differences in GPAs (six GPA measures altogether) based on whether a student experienced ECC; the 4-year combined data , $F$ (6, 902) = 8.69, $p < .01$; Wilk's $\Lambda = 0.95$; Year 2004, $F$ (6, 242) = 4.46, $p < .01$; Wilk's $\Lambda = 0.90$; and Year 2007, $F$ (6, 211) = 4.46, $p < .01$; Wilk's $\Lambda = 0.89$. In other words, students with ECC experiences earned higher GPAs than Non-ECC students based on the 2004-2007 four-year combined data, and 2004 data and 2007 data. The follow-up univariate ANOVAs indicated that in the 4-year combined data, 2004 data and 2007, student with ECC experiences earned higher GPAs in all six GPAs.

By contrast, MANOVAs revealed that in the 2005 and 2006 data there were no significant statistical differences in GPAs (six GPAs altogether) based on whether a student was ECC or non-ECC. The sources of these non-significant results were the 3rd semester GPA for 2005, and the 1st and 3rd semester GPAs and cumulative GPA at graduation for 2006. Since no difference was found between just the 3rd semester of ECC and Non-ECC students during these two years, it would be worthwhile to investigate their college experiences in this academic year.

**Comparison of ECC and non-ECC: credit loads.** Table 3 displays the results of means (M), standard deviations (SD) and statistical analyses for differences in Credit

Table 3

*Comparison of Credit Loads between ECC and Non-ECC Groups*

| | 2004 | | | 2005 | | | 2006 | | |
|---|---|---|---|---|---|---|---|---|---|
| Credit Loads | ECC | Non-ECC | | ECC | Non-ECC | | ECC | Non-ECC | |
| *Multivariate F* | 21.26** | | | 13.90** | | | 16.50** | | |
| | M | M | F(6, 242) | M | M | F(6, 209) | M | M | F(6, 219) |
| *1st semester* | | | | | | | | | |
| Semester | 15.07 | 14.51 | 5.4* | 15.09 | 14.49 | 8.7** | 14.70 | 14.23 | 4.4* |
| *2nd semester* | | | | | | | | | |
| Semester | 15.92 | 15.89 | 0.0 | 16.21 | 15.83 | 1.7 | 15.94 | 15.79 | 0.2 |
| Cumulative | 45.22 | 30.98 | 117.4** | 48.93 | 30.72 | 83.5** | 49.57 | 32.23 | 90.5** |
| *3rd semester* | | | | | | | | | |
| Semester | 16.05 | 15.37 | 5.1* | 15.62 | 15.40 | 0.4 | 15.68 | 15.05 | 3.6 |
| Cumulative | 61.67 | 46.82 | 100.4** | 64.95 | 46.53 | 77.2** | 65.88 | 48.33 | 80.9** |
| *Graduation* | | | | | | | | | |
| Cumulative | 137.50 | 129.59 | 17.4** | 137.96 | 132.14 | 7.1** | 140.10 | 131.00 | 14.1** |

| | 2007 | | | 4 Year Combined | | | | |
|---|---|---|---|---|---|---|---|---|
| | ECC | Non-ECC | | ECC | | Non-ECC | | |
| *Multivariate F* | 14.01** | | | 62.78** | | | | |
| | M | M | F(6, 211) | M | (SD) | M | (SD) | F(6,902) |
| *1st semester* | | | | | | | | |
| Semester | 15.05 | 14.27 | 10.0** | 14.98 | (1.68) | 14.38 | (1.47) | 27.6** |
| *2nd semester* | | | | | | | | |
| Semester | 16.21 | 16.31 | 0.1 | 16.07 | (2.08) | 15.93 | (1.99) | 0.9 |
| Cumulative | 50.31 | 32.05 | 79.1** | 48.43 | (14.47) | 31.48 | (7.45) | 358.2** |
| *3rd semester* | | | | | | | | |
| Semester | 16.11 | 15.46 | 4.2* | 15.88 | (2.37) | 15.31 | (2.13) | 12.3** |
| Cumulative | 67.11 | 47.86 | 78.1** | 64.84 | (15.33) | 47.37 | (8.63) | 331.0** |
| *Graduation* | | | | | | | | |
| Cumulative | 141.1 | 132.4 | 11.4** | 139.15 | (16.96) | 131.17 | (13.52) | 50.0** |

*Note.* $^{**}p < .01$, $^{*}p < .05$

Loads between ECC and Non-ECC groups for 2004 – 2007 data, and the four-year total. The analyses were conducted to answer Research Question 2: Are credit loads similar between ECC and Non-ECC students? Results of the multivariate analyses of variance (MANOVAs) revealed that there were statistically significant differences in Credit Loads (six measures altogether) based on whether a student experienced ECC in the 4-year combined data , $F$ (6, 902) = 62.78, $p < .01$; Wilk's $\Lambda = 0.71$, and all years: Year 2004, $F$ (6, 242) = 21.26, $p < .01$; Wilk's $\Lambda = 0.66$; Year 2005, $F$ (6, 209) = 13.90, $p < .01$; Wilk's $\Lambda = 0.72$; Year 2006, $F$ (6, 219) = 16.50, $p < .01$; Wilk's $\Lambda = 0.69$; and Year 2007, $F$ (6, 211) = 14.01, $p < .01$; Wilk's $\Lambda = 0.72$. In other words, cumulative credit loads of the student with ECC experiences were significantly heavier than Non-ECC students, based on 2004-2007 and the four-year combined data.

The follow-up analyses indicated that these differences were found in five of six Credit Loads measures; for instance, at graduation, cumulative credit loads of the student with ECC experiences (139.15) were significantly heavier than Non-ECC students (131.17). The only exception was found for the second semester credit loads; during the second semester, credit was similar between ECC (16.07) and Non-ECC (15.93), and this finding was consistent across all years and the combined 4-year data.

**Comparison of ECC and Non-ECC: Retention Rates.** Table 4 presents the results of Retention Rates to compare ECC to Non-ECC groups for 2004 -2007 data, and the four-year combined. The analyses were to answer the Research Question 3: Do the ECC students persist to a second semester, third year and on to degree completion at

a higher rate than the student without ECC? Fairly consistent results were obtained. The ECC students demonstrated significantly higher retention rates throughout 2nd and

Table 4
*Comparison of Retention Rates between ECC and Non-ECC Groups*

| | 2004 | | | 2005 | | |
|---|---|---|---|---|---|---|
| | ECC (n=225) | Non-ECC (n=150) | Chi-square | ECC (n=203) | Non-ECC (n=147) | Chi-square |
| Retention Rate | n (%) | n (%) | | n % | n % | |
| *2nd semester* | 215 (95.6) | 135 (90.0) | 4.46* | 196 (96.6) | 133 (90.5) | 5.58* |
| *3rd semester* | 197 (87.6) | 106 (70.7) | 16.55** | 174 (85.7) | 100 (68.0) | 15.69** |
| *Graduation* | 169 (75.1) | 82 (54.7) | 17.00** | 146 (71.9) | 72 (49.0) | 19.10** |

| | 2006 | | | 2007 | | |
|---|---|---|---|---|---|---|
| | ECC (n=217) | Non-ECC (n=160) | Chi-square | ECC (n=225) | Non-ECC (n=121) | Chi-square |
| | n % | n % | | n % | n % | |
| *2nd semester* | 208 (95.9) | 150 (93.8) | 0.85 | 221 (98.2) | 117 (96.7) | 0.81 |
| *3rd semester* | 178 (82.0) | 122 (76.3) | 1.89 | 198 (88.0) | 90 (74.4) | 10.46** |
| *Graduation* | 146 (67.3) | 83 (51.9) | 19.1** | 160 (71.1) | 62 (51.2) | 14.52** |

| | 4-Year Combined | | |
|---|---|---|---|
| | ECC (n=870 | Non-ECC (n=578) | Chi-square |
| | n % | n % | |
| *2nd semester* | 840 (96.6) | 535 (89.5) | 11.56** |
| *3rd semester* | 747 (85.9) | 418 (69.9) | 40.51** |
| *Graduation* | 621 (71.4) | 299 (50.0) | 59.04** |

*Note. **p <.01, *p <.05*

3rd semesters, and retention to graduation than Non-ECC students. A few exceptions were found during 2nd and 3rd semesters in 2006 data, and 2nd semester in 2007.

**Comparison of ECC and Non-ECC: Year to Degree.** Table 5 displays the results of means (M), standard deviations (SD) and statistical analyses for differences in

years to obtain a BA degree between ECC and Non-ECC groups for 2004 -2007 data, and the four-year combined. The analyses were to answer the Research Question 4: Do

Table 5
*Comparison of Year to Degree between ECC and Non-ECC Groups*

| | ECC | | | Non-ECC | | | |
|---|---|---|---|---|---|---|---|
| Year | n | M | (SD) | n | M | (SD) | *t* |
| 2004 | 169 | 4.10 | (0.59) | 82 | 4.32 | (0.78) | -2.21** |
| 2005 | 146 | 3.99 | (0.74) | 72 | 4.35 | (0.56) | -3.64** |
| 2006 | 146 | 4.08 | (0.77) | 83 | 4.18 | (0.45) | -1.23 |
| 2007 | 160 | 3.97 | (0.62) | 62 | 4.34 | (0.63) | -3.97** |
| Combined | 621 | 4.04 | (0.68) | 299 | 4.29 | (0.62) | -5.68** |

*Note. **p <.01*

the ECC students earn their baccalaureate degrees sooner than the students with no ECC? This hypothesis was accepted in that the ECC student, indeed, earned their degrees in a significantly shorter period; specifically, they spent 4.04 years, which was significantly shorter than the Non-ECCs' 4.29 years, $t = -5.68$, $p < .01$. This result was consistent for 2004, 2005, and 2007, but not for 2006.

**Discussion**

The data analyses in this study were typically consistent with the supporting literature in that students with ECC tended to fare better at Midwestern College academically in each area examined. The extent to which they succeed compared to non-ECC peers deserves further discussion. The researcher reminds readers to interpret academic results as a relationship between ECC experience and postsecondary achievement rather than ECC as a cause of academic differences between those students

and non-ECC peers (see Bailey & Karp, 2003; Karp et al., 2007; Klopfenstein & Thomas, 2005; Klopfenstein & Thomas, 2009; Koelling, 2008).

The demographic information for students in the sample provided an interesting perspective regarding the typical ECC student at Midwestern College. There were significantly more white students in the ECC versus the non-ECC students, and there were a significantly higher number of male students in the ECC group compared to non-ECC as well. This could speak to the difference in access to ECC opportunities for students of color. Austin-King et al. (2012) found that the rate of ECC among students of color was increasing at a rate higher than ECC for the overall high school population in the years considered for their study, 2006-2011. This indicates that the ECC profile for Midwestern College may have shifted after the cohorts considered for this research.

The contrast in GPAs at each semester examined was significant, especially the cumulative GPA at the end of the first year for the 4-years combined. This seems to contradict a concern with ECC students: given their advanced credit standing, they may need to enroll in more difficult classes sooner than non-ECC students (Koelling, 2008: Zunkel et al., 2012). Further examination regarding the courses ECC students enroll in their first year in comparison to non-ECC students may help determine whether the difference lies with an advanced level of coursework or sufficient preparedness for typical first year, introductory level courses. As aforementioned, the 3$^{rd}$ semester GPA of 2005 and 2006 was the only shared statistics in which no significant difference was determined, warranting a deeper look, but ECC students did obtain higher GPAs than non-ECC students more often than not.

Comparing cumulative credits after the second and third terms led to unsurprising results. ECC is intended to give students a head start with their college career, so it is no surprise the total credits earned for this group were higher than their non-ECC peers. As ECC students enrolled in more credits each semester, the gap in total credits grew from second to the third term, then, the groups became closer in cumulative credits at the time of graduation while ECC students still maintained a significantly higher level of cumulative credits. Since most courses at Midwestern College are four credits, the different in credit loads mean that ECC students are more than 4 courses ahead of their non-ECC peers after the second and third semesters after starting out just under four classes ahead, but just over 2 courses ahead at the time of graduation. The lessening of this gap could be due to the ability of ECC students to take lighter credit loads toward the end of their degree where non-ECC students must maintain an average of 15 credits per semester to complete the 120 credit requirement for a degree at Midwestern College.

The difference or lack thereof in the term credit loads of ECC and non-ECC students was interesting. ECC students tended to enroll in more credits in their first and third semesters when compared to non-ECC students, but both groups enrolled in about the same number of credits for their second semester. This could be attributed to the courses offered in the spring as opposed to fall semester at Midwestern College. While most full time, full semester courses are four credits, the fall semester offers first year seminar classes that range between two and four credits. Because there is a difference in the first semester credits of ECC and non-ECC students, perhaps more ECC students are enrolling in the four credit first year seminar classes than their non-ECC peers. The

fact that the difference is also evident in the third semester of enrollment is intriguing, and more analyses regarding these semesters of students' collegiate careers should be conducted.

ECC students completed their degree in a significantly shorter amount of time (4.04 years), but non-ECC students still completed their degrees in less than five years (4.29), when they completed their degree. The most concerning area regarding graduation for non-ECC participants is if they graduated at all. Non-ECC students at Midwestern College earned their degree at a rate of 50%. This rate was consistent with the statistic shared by McCauley in his explanation behind the push for ECC as a fill-in-the-gap solution between secondary and postsecondary academic expectations (2007), though he was considering all students in his rate. About 71.4% of ECC students at Midwestern College actually completed their degree.

The difference between the graduation rates for each group wasn't just a graduation issue, differences in retention start in earlier terms. ECC students continued on to second and then third semesters at a significantly higher rate than those without early college credits. The actual retention rates from year to year varied for both groups, but appear to be independent of each other (see Figures 4.1 and 4.2). That is to say, better retention of one group did not necessarily respond to better retention of the other, especially considering the first to third semester rates. This relationship was not examined in any of the literature reviewed, but may play a role in retention initiatives if groups are found to persist in different ways under similar circumstances.

*Figure 1.*
Student retention from 1st to 2nd Semester.

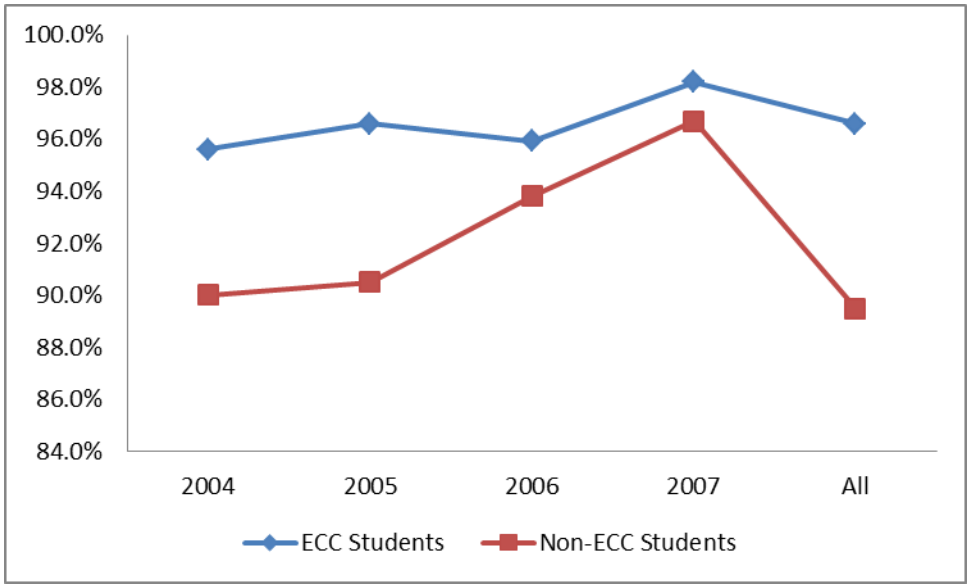
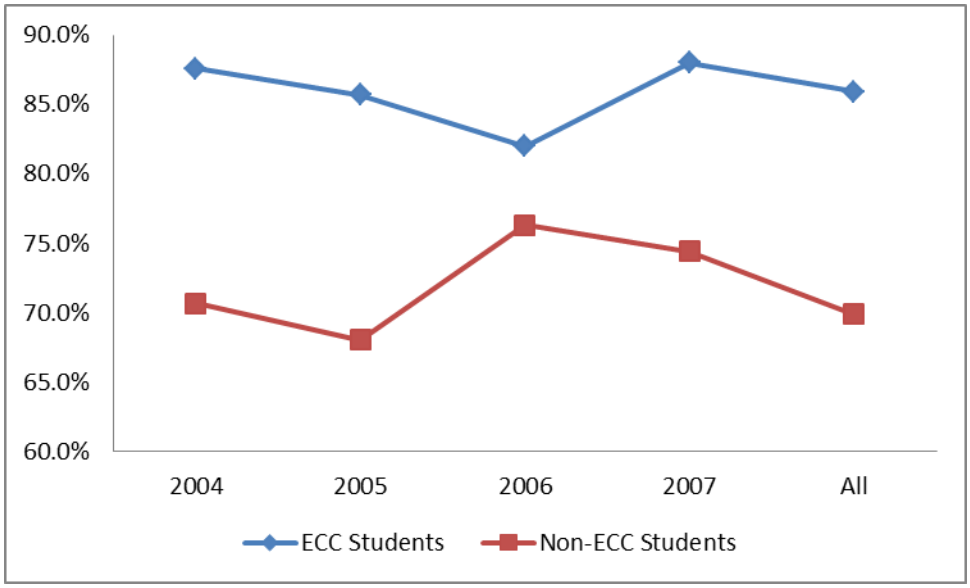



*Figure 2.*
Student retention from 1st to 3rd Semester.




**Summary**

The data analyzed in this study led to interesting results, most of which were consistent with those presented in the literature. Significant differences between ECC

and non-ECC were found within each of the variables explored, and, overall, ECC students earn higher first, second and third term GPAs, complete more credits, graduate with a higher GPA, and graduate earlier than non-ECC students.

# Chapter 5

## Summary and Conclusions

The purpose of this study was to provide Midwestern College with information regarding students with Early College Credits (ECC) credits earned through Advanced Placement, International Baccalaureate, or dual enrollment in comparison to those without and their respective academic achievements at the postsecondary institution. The implications of this study for Midwestern College as well as larger scale considerations are outlined in the following section. Then, as this study inspired more questions than answers as research often does, possible topics for future research are included before a brief chapter conclusion.

### Educational Implications

This research demonstrated that significant differences in college academic performance exist between ECC and non-ECC students at Midwestern College. These differences allow some predictions regarding GPAs, retention, credit loads and graduation rates for Midwestern College students.

While the higher rate of academic success for ECC students was supported by the literature, the institution-specific results from this research will be invaluable to Midwestern College in future review of transfer credit policies, advising methodology, and admission review processes. All of these operations vary from college to college, and hence each postsecondary school should consider their own body of students and

the extent of their differences in success or lack thereof when implementing practices affected by early college credit.

At Midwestern College, the findings could inform the application review process. Because students with ECC tend to succeed at Midwestern College, admissions counselors may consider the correlation between ECC coursework and likelihood to do well at Midwestern College. The counselors would need to keep in mind that ECC does not cause a student to succeed at the institution, and hence continue to consider other factors in their review and take care not to exclude non-ECC students because they are certainly capable of succeeding as well. A student's ECC experience may be most helpful in instances when little is known about a student or high school besides what is minimally disclosed in his or her application.

Based on these research results, once a student does enroll, advising could intentionally discern whether or not a student is bringing in college credits. These courses need to be considered in planning a student's semester and long-term academic plan. The not-as-obvious advising implications may actually exist with the non-ECC group. These students are not retained at the same level, nor do they complete their degrees as frequently or as quickly as their counterparts. Advisors could take notice of this and perhaps apply an added level of care to this particular group in the form of additional advising meetings, more intentional connections to other on campus resources, or another type of service to improve the level of enrollment from term to term and eventual degree completion of non-ECC students. Advisors and the Advising

Office at Midwestern College could look to literature regarding retention of non-ECC students in particular for these purposes.

A final major implication of the study involves the review of transfer credits. As the institution continuously reviews policies surrounding the review of incoming college credits, this study will provide the data needed to discern that, in general, students with ECC fare well at Midwestern College. Bigger questions remain surrounding specific sources of ECC and student success as well as specific ECC courses and corresponding Midwestern College academic records.

**Recommendations for Future Research**

The investigation regarding the impact of ECC on academic performance at Midwestern College provided a solid foundation for which to launch more in-depth studies at the institution in regards to ECC policies, advising, and admission practices, particularly for Midwestern College. The areas of interest that could be investigated further follow in this section.

While ECC students have tended to do well at the school, further research could investigate if one type of ECC is correlated with academic success more so than another. The relationship between ECC and academic divisions or majors could also be considered, as a relationship or lack thereof could influence admission recommendations or early advising for these students. Further, this research was only able to consider ECC experiences for which credit was awarded at Midwestern College. Future research could consider ECC experiences that did not transfer as credit to the

institution. For example, some students take AP courses, but opt out of the exam, or score less than a 3 on the exam at the end of the course. Other studies have considered students with AP experience, and research to come could follow a similar model (Murphy & Dodd, 2009; Sadler & Tai, 2007).

Validity of course substitutions, especially in sequenced classes, is definitely an area warranting further investigation. Consider students taking General Chemistry II, a course required for several majors and pre-professional programs at Midwestern College and a pre-requisite for upper level chemistry and biology courses, for example. Do students completing the General Chemistry I & II sequence earn higher grades in the sequence or in their major? What about students with ECC that substitutions for General Chemistry I but essentially retake the class at Midwestern College? And how do those students who start with General Chemistry II perform? Along the same line, future research could also look to non-sequenced coursework and seek to determine if there is one ECC class that is most highly correlated to academic success at the institution. Perhaps a composition course is most beneficial, since liberal arts curriculum is writing intensive, or college credit in calculus speeds up degree completion for students with certain majors. No significant difference between ECC course substitutions would provide useful information as well, especially in academic advising. Research into any of these areas would be especially helpful for Advisors, but could be distributed to prospective students, high schools teachers, and high school guidance counselors as they plan classes as a part of a student's secondary academic plan.

At Midwestern College, ECC and non-ECC students have been retained differently. Research into who is not reenrolling in each group would aid in retention initiatives at the institution. Given the varying patterns of each group, they would likely need to be considered separately and research would include several other parameters such as high school record, socioeconomic status, test scores, and other demographic variables. The literature reviewed for this study did not discuss the differences in retention of the two groups beyond why it exists, so this study could inform other research conducted on a larger scale.

Finally, this research could be extended to intentionally investigate ECC experience as a cause of academic success at Midwestern College versus an indicator of potential success. This research could control for other academic marks, such as grade point average and strength of curriculum, but could also consider test scores, financial need, and other factors, similar to the studies reviewed for this work (Karp et al., 2007; Klopfenstein & Thomas, 2005; Klopfenstein & Thomas, 2009; Swanson, 2008).

**Summary**

This study has laid a foundation for examining the relationship between early college credit experiences and academic performance at Midwestern College. As ECC has been connected to higher GPAs, credit loads, retention and graduation rates, as well as a shorter time to degree, the predictive nature of ECC experience can be utilized to further the success of ECC and non-ECC students alike at Midwestern College. The groups are distinct, and future studies could examine more of the differences between

the two sets of students and further investigate what causes student success at the institution.

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# Appendix



**Kalee Nuest <nuestk@morris.umn.edu>**

## 1401E47244 - PI Nuest - IRB - Exempt Study Notification

**irb@umn.edu** <irb@umn.edu> Fri, Jan 17, 2014 at 4:53 PM
To: nuestk@umn.edu

TO : bmunson@umn.edu, nuestk@umn.edu,

The IRB: Human Subjects Committee determined that the referenced study is exempt from review under federal guidelines 45 CFR Part 46.101(b) category #4 EXISTING DATA; RECORDS REVIEW; PATHOLOGICAL SPECIMENS.

**Study Number:** 1401E47244

**Principal Investigator:** Kalee Nuest

**Title(s):**
The Impact of Dual Enrollment on Postsecondary Academic Achievement

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This e-mail confirmation is your official University of Minnesota HRPP notification of exemption from full committee review. You will not receive a hard copy or letter. This secure electronic notification between password protected authentications has been deemed by the University of Minnesota to constitute a legal signature.

The study number above is assigned to your research. That number and the title of your study must be used in all communication with the IRB office.

If you requested a waiver of HIPAA Authorization and received this e-mail, the waiver was granted. Please note that under a waiver of the HIPAA Authorization, the HIPAA regulation [164.528] states that the subject has the right to request and receive an accounting of Disclosures of PHI made by the covered entity in the six years prior to the date on which the accounting is requested.

If you are accessing a limited Data Set and received this email, receipt of the Data Use Agreement is acknowledged.

This exemption is valid for five years from the date of this correspondence and will be filed inactive at that time. You will receive a notification prior to inactivation. If this research will extend beyond five years, you must submit a new application to the IRB before the study's expiration date.

Upon receipt of this email, you may begin your research. If you have questions, please call the IRB office at (612) 626-5654.

You may go to the View Completed section of eResearch Central at http://eresearch.umn.edu/ to view further details on your study.

The IRB wishes you success with this research.

We value your feedback. We have created a short survey that will only take a couple of minutes to complete. The questions are basic, but your responses will provide us with insight regarding what we do well and areas that may need improvement. Thanks in advance for completing the survey. http://tinyurl.com/exempt-survey

**Kalee Nuest <nuestk@morris.umn.edu>**

## IRB Acknowledgment of Change in Protocol Request

**irb@umn.edu** <irb@umn.edu> Thu, Mar 6, 2014 at 8:13 AM
To: nuestk@umn.edu

TO : bmunson@umn.edu, nuestk@umn.edu, The IRB has reviewed and acknowledged your change in protocol for the study listed below:
**Study Number:** 1401E47244
**Principal Investigator:** Kalee Nuest
**Title(s):**
The Impact of Dual Enrollment on Postsecondary Academic Achievement

Your study was determined previously to be exempt from IRB review in one of the following categories 45 CFR 46.101(b):

#1 INSTRUCTIONAL STRATEGIES IN EDUCATIONAL SETTINGS.

#2 SURVEYS/INTERVIEWS; STANDARDIZED EDUCATIONAL TESTS; OBSERVATION OF PUBLIC BEHAVIOR.

#3 PUBLIC OFFICIALS; SURVEYS/INTERVIEWS; OBSERVATION OF PUBLIC BEHAVIOR.

#4 EXISTING DATA; RECORDS REVIEW; PATHOLOGICAL SPECIMENS.

#6 TASTE TESTING AND FOOD QUALITY EVALUATION.

The changes you have proposed do not alter your exempt status. No action is needed at this time

Please do not hesitate to contact the IRB office at 612-626-5654 or irb@umn.edu if you have any questions.